

REMARKS:

Claims 29-37 are in the case and presented for consideration.

Claims 29-32 have been amended to overcome the rejections made pursuant to §112.

New claim 33 combines the limitations of prior claims 16, 18 and 21. Claim 33 further specifically recites the chuck unit includes a chuck for holding a tool. This feature is supported in the specification at page 6, lines 2-4 and canceled original claim 14. Claims 34-37 correspond to claims 24-27, now made to depend directly and indirectly from claim 33.

This invention relates to a 5-axes machine; i.e. to a machine tool in which a tool head is mounted on a support moving along three Cartesian axes and which bears a spindle which can be positioned along two rotational axes.

The spindle can be a mechanical spindle (or power spindle, running at 2,000-3,000 rpm), with a motor placed in the support of the head and a mechanical transmission, or a motor spindle (or finishing spindle, which includes its own motor and runs at 20,000-25,000 rpm).

In all the known 5-axes machines, to substitute the spindle, it is necessary to substitute the whole head; i.e., not only the chuck, but also the transmission (shafts, gears, etc.).

A machine does not exist where it is possible to substitute, in a head with two degrees of freedom, the spindle alone, without disassembling the head.

To this end, the invention provides for a head in which:

- 1) the spindle is cantilever-mounted on the head;

2) the head comprises a support 16, the angular position of which is numerically controlled and that can be coupled with both a mechanical and a motor spindle; and

3) the shaft which transmits the power to the mechanical spindle is made of two engageable parts 10, 11, one of which remains in the head, and the other is integral with a bevel gear pair on the spindle.

Rejections based on Lewis '465

Lewis '465 does not teach a removable chuck support piece rotatable about the drive shaft axis and in a second axis - the chuck and tool can rotate about a second axis, but not the chuck unit housing. The tool is not positionable on 5 axes - only on 4. Note that the B-axis motion is described as a drive axis only for the tool, whether it nutates or rotates.

That is, in the claimed invention, the chuck unit housing can rotate about both C and A axes, while having rotation/other movement of a tool held in the chuck about the B axis. In all three independent claims 29, 31 and 33, the chuck unit is rotatable on the second support.

As used by the applicant, "chuck unit" is intended to mean the housing, which includes a chuck for holding a tool. This is illustrated in the drawings where reference numeral 5 is used to indicate the chuck unit, rather than a tool-holding chuck at one end or the other. The applicant has noted that the Italian term "mandrino" used in the priority application includes both the housing and the portion bearing a tool, and has been translated as "chuck" as the closest English equivalent.

Rejections based on Corsi '436

Applicants submit that differences between Corsi '436 and the claimed apparatus include the fact that the chuck 4 of Corsi '436 is not replaceable. It is suggested by the

examiner that the chuck 4 of Corsi '436 could be replaced "manually" and is therefore "interchangeable", but this is not suggested by Corsi '436.

The enclosed drawing shows the spindle separate from the head. Please note that elements 23 and 24 are ducts for exhausting chips and are behind the spindle so that they do not interfere with removal of the chuck. Ducts 23 and 24 are not supported by the spindle.

Accordingly, the application and claims are believed to be in condition for allowance, and favorable action is respectfully requested. No new matter has been added.

If any issues remain which may be resolved by telephonic communication, the Examiner is respectfully invited to contact the undersigned at the number below, if such will advance the application to allowance.

Favorable action is respectfully requested.

Respectfully submitted,


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